

**AN INTERNAL COMBUSTION ENGINE EXHAUST COMPONENT AND A  
METHOD OF MAKING AN INTERNAL COMBUSTION ENGINE EXHAUST  
COMPONENT**

**REFERENCE TO RELATED APPLICATIONS**

[0001] This application claims priority to PCT Application PCT/EP2004/011475 filed on October 13, 2004, which claims priority to Spanish Application No. ES 200302412 filed on October 16, 2003.

**BACKGROUND OF THE INVENTION**

[0002] This invention relates to an internal combustion engine exhaust component and particularly, but not exclusively limited to, a rear box of an internal combustion engine exhaust and a method of making such an internal combustion engine exhaust component.

[0003] Components for internal combustion engine exhaust systems are designed to withstand extremely harsh conditions and to retain their integrity over a substantial period of time. In particular, most exhaust systems are guaranteed, normally for a period of three years. During that time, the material from which the exhaust system is constructed must withstand extremes of temperature and external environmental conditions such as water, dust and salt. The material must also be able to withstand the contents of the exhaust gases expelled from the internal combustion engine. In particular, the exhaust components must withstand, internally, gas at very high temperatures, unburnt fuel, and particulates carried in the gas and condensates, particularly condensates produced as a by-product of the catalytic processes now generally required of exhausts to meet environmental regulatory standards. The rear box of internal combustion engine exhausts receives a combination of gas, particulate and condensates. The condensates are corrosive. Accordingly, it is known to provide condensate evacuation devices to remove condensate from the rear box to prevent the condensate from building up and corroding the rear box from the inside out. Thus, DE3614213 shows an exhaust silencer having holes in its base to allow condensates to drain away. Alternatively, US 6430921 and US 4610700 provide absorbent material in the bottom of the silencer shell to absorb condensate.

[0004] Also, it is known to apply an anticorrosive lining in the form of a sheet of more corrosive resistant steel to the complete interior circumferential of a rear box made

from sheet steel of less corrosion resistance. The anticorrosive lining material is relatively expensive compared to the material used for the remainder of the exhaust system.

### **SUMMARY OF THE INVENTION**

**[0005]** It is an object of the invention to provide an improved combustion engine exhaust component.

**[0006]** According to a first aspect of the invention, an internal combustion engine exhaust component includes a shell having outer and inner surfaces and defining a chamber. The inner surface of the shell has a first part susceptible to exhaust condensate contact and a second part not susceptible to exhaust condensate contact. A lining is applied over only the first part to protect the first part from exhaust condensate contact.

**[0007]** By limiting the application of the anti-corrosive material only to those parts where condensate is likely to contact, the material cost for the exhaust component is substantially reduced without effecting the life and/or performance of the component. Incidentally, a small weight reduction is also achieved.

**[0008]** The shell is preferably made from a material which is thicker than the chamber lining. The shell is preferably 0.8mm thick and most preferably made from DIN 1.4512. The chamber lining is preferably 0.5mm thick and most preferably made from DIN 1.4113.

**[0009]** The lining may be applied to the inner wall of the outer shell by a variety of means, but most preferably by spot welding. The chamber lining preferably covers approximately one-third to one-half of a surface area of the inner surface of the outer shell.

**[00010]** According to a second aspect of the invention, an internal combustion engine exhaust component includes a shell having outer and inner surfaces and defining a chamber. A lining is applied over approximately one-third to one-half of a surface area of an inner surface of the shell.

**[00011]** According to a third aspect of the invention, a method of making an internal combustion engine exhaust component includes the steps of providing a shell having outer and inner surfaces and defining a chamber, determining parts of the inner surface of the shell which will be contacted by condensates when in operation and applying a lining to those parts of the shell.

[00012] The method preferably includes the steps of providing the shell as a substantially flat sheet of material, applying the lining to the shell and then forming the shell into the shape of the exhaust component. The lining is preferably applied by spot welding to the shell.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[00013] An internal combustion engine exhaust component will now be described in detail by way of example and with reference to the accompanying drawings in which:-

[00014] Figure 1 is a side sectional view of an internal combustion engine exhaust component in accordance with the invention;

[00015] Figure 2 is a sectional view taken on line II-II in Figure 1;

[00016] Figure 3 is an enlarged sectional view of the part of the exhaust component of Figure 2 circled and indicated at III; and

[00017] Figure 4 is an enlarged sectional view of part of the exhaust component of Figure 2 circled and indicated at IV.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

[00018] In Figure 1, an exhaust component 10, in particular a rear box of an internal combustion engine exhaust, includes a cylindrical shell 12 with an input end cap 14 and an output end cap 16. The shell 12 and the end caps 14 and 16 define a chamber 18. Two circular baffles 20 and 22 are arranged within the chamber 18 spaced apart from one another. The first baffle 20 is arranged towards the input end cap 14, and the second baffle 22 is arranged towards the output end cap 16. The chamber 18 is thus subdivided into first, second and third sub-chambers 18a, 18b and 18c, respectively. The first sub-chamber 18a is defined between the input end cap 14 and the first baffle 20, the second sub-chamber 18b is defined between the first baffle 20, and the second baffle 22, and the third chamber is defined between the second baffle 22 and the output end cap 16. An input pipe 24 extends through an aperture 26 in the input end cap 14, through an aperture 28 in the first baffle 20 and through an aperture 30 in the second baffle 22. The input pipe 24 is received with an interference fit through the apertures 28 and 30. The input pipe 24 has a plurality of perforations 32 formed in its wall in the region between the first and second baffles 20 and 22. An output pipe 34 extends from the subchamber 18a, through the

apertures 36 and 38 in the first and second baffles 20 and 22, respectively, and through an aperture 40 in the output end cap 16. The outlet pipe 34 is received with an interference fit by the apertures 36 and 38. Generally, when installed on a vehicle, the exhaust component 10 is arranged such that the input pipe 24 is above the output pipe 34. The baffles 20 and 22 each have a port 42 and 44, respectively, formed at an outer edge thereof beneath the output pipe 34.

[00019] Turning to Figure 2, in rear boxes of internal combustion engine exhausts, condensates can build up. Figure 2 illustrates the condensates at reference numeral 46. As stated above, it is known to use condensate evacuation devices to evacuate the condensate from the rear box. The condensate evacuation devices will only allow a certain amount of condensate to remain in the rear box before the condensate is evacuated. Accordingly, the maximum level of condensate 46 is known for each such component. In Figure 2, the maximum level of condensate is indicated by depth D. Of course, when the exhaust component 10 is arranged on a vehicle, it is subjected to acceleration forces due, for example, to the exhaust system vibrating or to the motion of the vehicle to which the exhaust system is connected. That will cause some movement of the condensate 46 within the exhaust component 10 and the maximum extent of that movement of the condensate 46 can be calculated for each component by carrying out appropriate testing of the exhaust component 10, for example, by vibration testing and by road testing of example systems on a vehicle. The maximum extent of condensate movement is indicated in Figure 2 between radial lines A and B. Accordingly, a surface area of an inner surface of the shell 12 between the radial lines A and B will be subjected to an increased level of corrosion due to the contact with the condensate 46. In the present invention, a lining 48 is applied to the inner surface of the shell 12 in the region between the radial lines A and B. The lining 48 is more clearly illustrated in Figure 3.

[00020] Generally, the shell 12 would be made from DIN 1.4512 with a thickness of approximately 0.8mm, and the lining 48 applied to the area between the radial lines A and B will include material DIN 1.4113 of approximately 0.5mm thickness. Of course, alternative materials and/or thicknesses of material are within the ambit of the skilled person to select depending upon the particular component and circumstances pertaining to that component.

[00021] The lining 48 is applied to the relevant surface of the shell 12 by spot welding. Generally, the lining 48 will be applied to the shell 12 when the shell 12 is

arranged as a flat sheet, and the shell 12 will then subsequently be bent around the baffles 20 and 22. The shell 12 will be crimped to secure the shell 12 relative to the baffles 20 and 22. The crimp 50 is shown in detail in Figure 4 and is conventional in form. Subsequently, the end caps 14 and 16 will be applied to the subassembly of the outer shell.

**[00022]** The present invention provides a substantial saving on material cost and also provides a small weight saving without compromising the corrosion resistance or wear properties of the exhaust component 10.

**[00023]** Although a preferred embodiment of this invention has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content of this invention.